

# INTEGRATED TRANSPORT SYSTEM TOWARD SUSTAINABLE TRAVEL BEHAVIOR FOR WORK COMMUTING TRAVEL FROM BEKASI TO JAKARTA

**Rinawanti Safitri**  
Civil Engineering,  
Gadjah Mada University  
Jln. Grafika No. 2,  
Kampus UGM,  
Yogyakarta 55281  
Phone: +6281210010490  
safitririnawanti@gmail.com

**Samuel Petros Sebhatu**  
Business Administration  
at CTF and Senior Researcher  
of SAMOT,  
Karlstad University  
Phone: +465470002163  
samuel.sebhatu@kau.se

**Sigit Priyanto**  
Civil Engineering,  
Gadjah Mada University  
Jln. Grafika No. 2,  
Kampus UGM,  
Yogyakarta 55281  
Phone: +62811268395  
spriyanto2007@yahoo.co.id

## Abstract

Due to the inadequacy of public transport and high critical level of congestion in Jakarta Metropolitan Area, implementing sustainable transport for urban future transport improvement is necessary. Critical transport situation in Jakarta Metropolitan Area has pointed the importance of implementation integrated transport system to increase people accessibility. This study is conducted to identify strategic issues in integrated transport system at operational and policy levels toward sustainable mobility, transport equity, and door to door service. According to research aim, explanatory case study is used to build an understanding the current situation. The results indicate that integrated transport system is not fully implemented yet and it found a lot of missing links and barriers in integrated transport system attributes. Moreover, transportation planning at national to local levels is not synchronous which have impacted to the implementation of integrated transport.

**Keywords:** integrated transport, transport system, transport policy, mobility

## Abstrak

Tidak memadainya transportasi umum dan tingginya tingkat kemacetan lalu lintas di Kota Metropolitan Jakarta menyebabkan diperlukannya penerapan transportasi yang berkelanjutan untuk perbaikan transportasi perkotaan di masa depan. Situasi transportasi di Jakarta yang telah kritis ini menunjukkan pentingnya penerapan sistem transportasi terpadu untuk meningkatkan aksesibilitas masyarakat. Penelitian ini dilakukan untuk mengidentifikasi isu-isu strategis dalam sistem transportasi terpadu di tingkat-tingkat operasional dan kebijakan terhadap mobilitas yang berkelanjutan, ekuitas transportasi, dan layanan pintu ke pintu. Penelitian ini menggunakan studi kasus untuk menjelaskan situasi yang terjadi saat ini. Hasil penelitian menunjukkan bahwa sistem transportasi terpadu belum sepenuhnya dilaksanakan dan ditemukan banyak *missing links* dan hambatan dalam atribut-atribut sistem transportasi yang terintegrasi. Selain itu, perencanaan transportasi di tingkat nasional dan di tingkat daerah tidak sejalan yang berdampak pada pelaksanaan transportasi terpadu.

**Kata-kata kunci:** transportasi terpadu, sistem transportasi, kebijakan transportasi, mobilitas

## INTRODUCTION

The high number of private vehicle user raised the traffic congestion, pollution, noise, accidents and economic loss and it happens for a few decades. One of the cities at developing countries who face the critical transportation problem is Jakarta. As the capital city and main business center in Indonesia, Jakarta has evolved this city into one of

megacities in Southeast Asia and second largest urban agglomeration in the world (Demographia, 2015). The rapid economic growth stimulates the urbanization and attracting million people to come, work and live in Jakarta. Nowadays, Jakarta agglomeration or most people known as Jabodetabek (Jakarta-Bogor-Depok-Tangerang-Bekasi) become an integral part with the total population in 2010 is about 28 million people (JICA, 2012). Urban agglomeration in Jakarta indicate that city growth in inefficient, uncontrollable way, sprawl, and incremental. This type of urban growth has driven increasing of vehicle ownership (Banister, 2005) and, finally, it stimulates inefficient travel behavior.

Based on the data, motorization growth in Jakarta Metropolitan Area (JMA)-this term will use to refer Jabodetabek in this paper- is about 11 % per year (Koalisi TDM, 2009) and it is increasing from year to year. Every day the traffic congestion becomes a part of daily live and it have affected economic loss 2.5 trillion rupiahs/day (JICA, 2012) and people quality of live. The existence of urban agglomeration is exacerbating the congestion condition in Jakarta because the neighboring cities around Jakarta are generated 7 million trips per day (JICA, 2012) and market share for public transport is small only about 23 % to 30 % (BPS, 2015). Current public transport service quality which connect people from outside Jakarta to inner city have insufficient service quality (JICA, 2012) and it makes public transport condition find unattractive for commuter.

Generating effective transport policies that might change people travel behavior, from car oriented to public transport oriented, is by providing seamless mobility through public transport (Bruijns and Hartkamp, 2002). The main necessary for urban traveler is flexible mobility and the eminence of private vehicle is could provide it. Therefore, to make public transport attractive for user is by providing door-to-door service through integrated transport system. The idea of integrated transport system is not new for developed countries, it have implemented for years. Yet, it is successful to make people to choose public transport rather than private vehicle. Main concern of integrated transport system and door to door service is providing transport accessibility and seamless journey. Single transport modes, like what have developed now, do not meet the mobility needs for urban citizen but integrated transport system would be capable to deliver it. This service will allow people to have easy access from the moments their get out from the door to their final destination (Kanafani and Wang, 2010). Regarding to the issue, the research is conducted to give a strategic issue overview in integrated transport system at operational and policy level in the JMA.

The main aim of implementing concept sustainability mobility to the current transport system encourage people to shift from motorized transport to public transport or/and non-motorized transport (Banister, 2008). Recently, many researches finding discussed about the importance of integrated transport system to encourage sustainable mobility. The term of integration has close relationship to sustainability agenda and it

strengthened by Hull's arguments (2005) which implies the key drivers of policy integration is sustainability agenda and it is necessary to involve social, economic, and environmental aspect comprehensively. May and Roberts (1995) perspective, using integrated approach will encourage much more advantage rather than single transport policy measures. Yet, integration could encourage a synergy of transport policy measures which is the key success to meet the strategic objective of sustainable transport agenda.

Potter and Skinner (2000) define transport integration as a series of stage towards integration and sustainability then using incremental approach to achieve it. The practical form of integrated transport policy should give multiple choices for travel, facilitate the journey by walking or cycling, enhance public transport options, and using environmental friendly vehicle, if the only choice for travel is by car. Previous research which related to integrated transport system and door to door service has summarized several strategies to enhance integrated transport implementation (please see Table 1).

**Table 1** Integrated Transport System Strategy from Previous Research

Researcher	Researches Finding	Integrated Transport System Strategy
Potter and Skinner (2000)	An integrated transport based on their scale or level.	Functional or modal integration, transport and planning integration, social integration, holistic integration.
May and Roberts (2006)	Broader Perspectives of Integration.	Integration between policy instruments involving different modes, integration between policy instruments involving infrastructure provision, management, information, pricing, integration transport measures and land use planning, integration transport.
Solecka (2013) in Novec and Solecka (2014)	Model of integration specifically talk about the public transport system integration (Solecka, 2013 in Novec and Solecka, 2014).	Infrastructure, organizational, economic integration, financial integration, information integration and spatial integration.
Novec and Solecka (2014)	Emphasized on integration urban transport system which encourage attractive transport service chain.	Public transport integration, public and private integration and policy integration.

Recently, the issue about social equity in transport becomes an interest in transportation planning and policy (Solomon, 2003). The part of community who often experience of social exclusion in transport is unemployed, family who have kids, low incomes group, older people, disable, women, and children (Solomon, 2003). The key issue about the connection of social exclusion in transport was affordability, availability and accessibility (Solomon 2003). Mobility is provided an access to basic needs, services and activities, therefore each social groups should have an equal opportunity in urban mobility systems. Then, to overcome the equity issue on mobility and fulfil the mobility needs of urban population, facilitate travellers with public transport service and non-

motorized infrastructure would fill the gap in equity issue (UN Habitat, 2013). However, the solution to overcome transport equity issue is not merely about providing public transport, the most important thing is how to make public transport affordable for social exclusion group.

Integrated transport system is one of solutions to encourage sustainable mobility and transport equity (May and Roberts, 1995). Transport integration may happen at different level and require many transport measures (Nosal and Solecka, 2014). The form of transport integration may happen at practical level and broader perspective by looking the integration at policy level (May et al., 2006). The implementation of integrated transport system in operational or policy level would lead to door-to-door transport service. Both approaches have the same vision which is providing series of mobility solution. Provide people with integrated transport system as well as door to door service may lead to the fulfillment of mobility for all and it is suitable to concept of transport equity- all people should have the equal opportunity in mobility (UN Habitat, 2013). On other word, implement integrated transport system may generate sustainable mobility and simultaneously transport equity.

## **METHODOLOGY**

The method to conduct this research is using explanatory research case study. Explanatory case study is trying to build an understanding about current situation based on theory (Collis and Hussey, 2014). Variables, indicators and parameters are built from the literature review of journals, government documents, and implementation of integrated transport system in several countries. In order to confirm theory to current situation, data collecting process involve field observation, in-depth interview, literature review, and questionnaire.

Since the research methodology is qualitative, data collection might be combined using different type of techniques. Data collection techniques for this research will use observation and in-depth interview. Observation will be done by nonparticipant observer to observe field condition and situation in research location. To support primary data collection, this research is using secondary data from Ministry of Transportation and the Jakarta Government. Government document which related to the research focus is analyzed in order to find the implementation of integrated transport system at policy level.

Data analysis combines content analysis and deductive analysis. Previous journal, books, study, policy and planning document from several best practices country are analyzed in order to arrange variables/attributes for implementing integrated transport system and door-to-door service. This analysis is helpful in selecting variable or attributes which have high possibility to implement in Jakarta, Indonesia. Result from content analysis process is giving a hypothesis about the ideal strategy which translated into set of

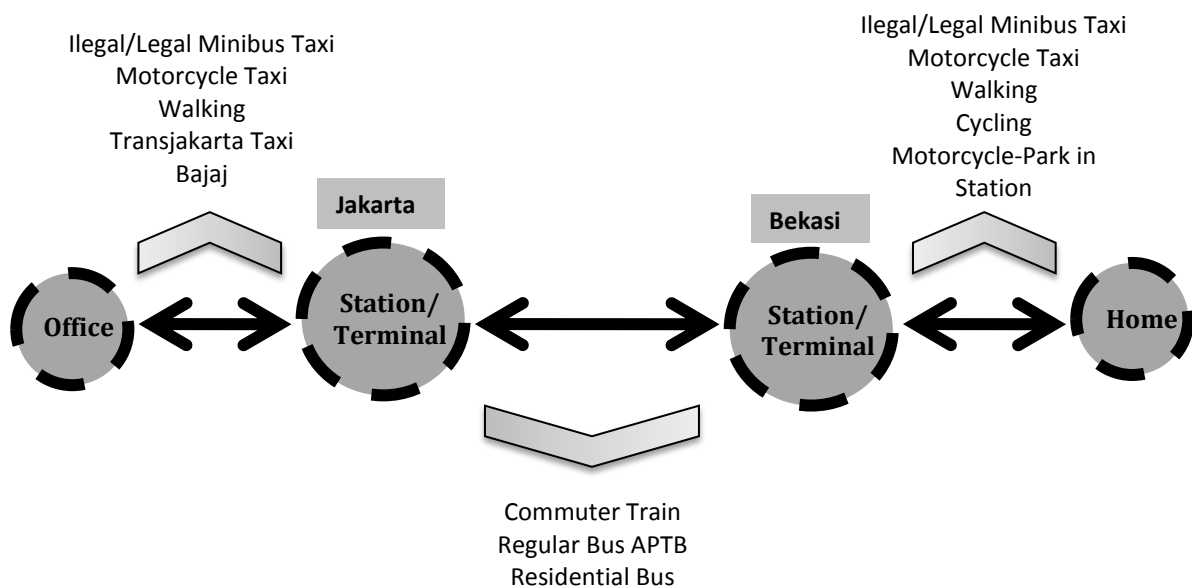
attributes or variables for implementation of door-to-door service towards integrated transport system. The variables or attributes is confirmed to empirical condition which are home-based work trip from Bekasi to Jakarta to understand the missing link of current commuting behavior from theoretical perspectives.

## RESULTS AND DISCUSSIONS

### Integrated Transport System Principle Implementation

Identifying implementation of integrated transport system to the current condition is using 5 attributes, which are modal integration, information integration, pricing integration, and infrastructure integration.

Evaluating modal integration implementation should be started from how does the daily journey of commuter from Bekasi to Jakarta. Figure 1 is giving general information about the way of commuter travel from home to office, trunk service availability which connects people from Bekasi to Jakarta and feeder modes service availability. The identification of modal integration performance is determined based on a normal condition which there is no major disturbance of public transport service. It indicates that the barrier of modal integration come from trunk service and feeder service. For example, minibus taxis is successful to provide service until neighborhood area with high-frequency service but the level of uncertainty from minibus taxi is still high whereas to encourage people using public transport the uncertainty level should be removed. The uncertainty situation is occurred to current transport system such as long waiting time, unpredictable of service and information (Hine and Scott, 2001).



**Figure 1** Commuter Travel Behavior

In integrated transport concept, non-motorized facilities are important to encourage people using public transport and if wide-range modal integration is accommodated, it might increase people accessibility (GTZ, 2009). However, current condition indicates there are lack of non-motorizes facilities (bicycle and pedestrian access) in Jakarta and Bekasi. This condition is not appropriate with the integrated mission- to deliver sustainability- because it does not give traveller an opportunity to go by walking and cycling (Potter and Skinner, 2000) to reach the station or terminals. The low level of modal integration due to public transport network is not planned in a unified network. A unified network plan is important because it could generate the successfully of public transport in providing seamless multi-destination travel (Dodson et al., 2011). The establishment of unified network and alleviating the uncertainty situation is in line with door-to-door principle which important to guarantee the travel continuity and current implementation of multimodal integration could not be delivered this necessity.

The point of providing the traveler with public transport information is letting traveler arrange individual journey (Department for Transport, 2013). Identifying the current degree of information integration to current public transport system, it uses five indicators which are location information, types of information, timetables coordination, real-time information, fares and ticket product. Determination these indicators are according to the principal of door-to-door service which encourages traveler with precise, accessible and reliable various information of public transport mode.

The evaluation of information integration is emphasized on formal public transport which is bus and commuter train service. For feeder service, the evaluation is not carried out since the characteristic of feeder service in the JMA under the conventional management system. Based on the identification of information integration indicator in commuter train and bus service, public transport information is not integrated yet and its only commuter train is providing the travel information for the passenger. Inter-zonal bus service does not have specific travel information even passenger could not get an access to time-schedule information. It would be difficult to establish information integration since both services are at different level.

In summary, the information from public transport service in the JMA is still disconnected. The clear and quite accessible information only provide by commuter train service, whereas information is the important element for the public transport network (Dodson et al., 2011). The availability of interlinked information will lead to the highest level of public transport ridership since passenger could arrange their journey by combining the route segments and network. Each public transport operator has different scheme and even the bus service do not provide the user by clear information. The imbalance development between bus service and train service is one of barriers why information integration implementation far from ideal condition- passenger could get information from different network and different transport modes (Nosal and Solecka,

2014). Yet, the absence of timetable coordination indicates the organizational coordination among public transport operator is not established.

The function of pricing integration is to make sure passenger get the best economical and financial condition when combine different means of transport in a journey (Nosal and Solecka, 2014). There are four elements of pricing integration which are smart and integrated ticketing system, ticket unification, unified ticketing facilities and transport cost. Based on research finding, each public transport has different payment system but the existence of e-banking product from third party indirectly creates the unified ticketing system and facilities.

Generally, current system is creating an inconvenience change system for public transport user. Meanwhile, deliver door-to-door journey and offer seamless travel convenience, the affordable ticket is important to make people confident in using public transport (Department for Transport, 2013). Even though some of public transports (Bus Rapid Transit system and Commuter Train) are subsidized by government, if combine two modes of transport from home to office and there is no free transfer between other modes, passenger spends much money for their daily journey. Logically, the free transfer cost system between different public transport operators may result to lost revenue but it could increase public transport attractiveness. Finally, the number of people using public transport will increase.

Overall, the progress of public transport pricing integration is on the right track. The development of smart ticketing system, ticketing facilities and ticket unification is already begun even though in fragmented manner. The important point from this case, organizational coordination between the public transport operator and private organization help to generate the pricing integration. To reach seamless travel and door-to-door service, all transport operators should maintain the coordination and establish receptive institutional environment (UN Habitat, 2013) to bring the pricing integration concept into the greater level.

Concept of integrated transport system is emphasized on connectedness different means of transport. The importance point from infrastructure integration is encouraged network integration and as a result, it gives the convenience in transfer to different modes. There are four indicators that construct infrastructure integration, which are interchange facilities, park and ride facility, kiss and ride, bike parking and bike sharing facilities. Current condition indicates the interchange facilities between public transports are not well established yet. Public transport user is still facing barriers when did the interchange to other public transport modes. Current condition indicates the interchange only possible within same type public transport mode with feeder service is easy to find. Second indicator, park and ride facility near train station does not have appropriate space for car and not all interchange facilities provide parking space for car in Bekasi. Meanwhile, availability of parking space is main feature of park and ride facility. The third and fourth indicators are kiss and ride and bike parking and sharing. Both in station or terminal there

is no specific place for dropping and picking off but it is possible to drop and pick off people in front of the station and terminal. The same goes to bike sharing and parking; there is none of bike share facility and appropriate bike parking facility.

Overall, infrastructure integration in case study is not well implemented and it needs improvements since current infrastructure integration is not established in appropriate way and facilitated seamless transfer. Reflect to current infrastructure integration implementation, it is necessary to do many improvements in order to eliminate the barrier because transport infrastructure is important for setting up integrated transport system. Besides that, it should be considered to build connection between non-motorized transports since the principle of multimodal or intermodal journey should increase opportunity for all transport users (GTZ, 2009). Current interchange facility should be improved in order to accommodate access to public transport and switch between public transports.

### **Synchronization of Transportation Master Plan**

National government has been proposed “*The Study on Integrated Transportation Master Plan for Jabodetabek (SITRAMP)*” master plan to lead transportation planning toward integrated transport system in the JMA. The existence of SITRAMP indicates that government has high commitment to alleviate transportation problem in the JMA. Ideally, transportation planning from city and municipality in the JMA should follow SITRAMP master plan. SITRAMP master plan also proposed public transportation master plan or known as Jabodetabek Public Transportation Policy Implementation Strategy (JAPTRAPIS). In JAPTRAPIS, the public transport strategy is explained in detail for transportation master plan until 2020 (JICA, 2012). In some part, proposed public transport development in SITRAMP and JAPTRAPIS indicates un-synchronous guidelines. The sign of un-synchronous transportation planning guideline affects the transportation policy in DKI Jakarta. Both DKI Jakarta Regional Planning (in transportation section) and DKI Jakarta Macro transportation planning refer the transportation planning from SITRAMP. Ideally, DKI Jakarta’s transportation planning should consider both master plan (SITRAMP and JAPTRAPIS).

The unsynchronized master plan from top to bottom government could be caused by each transportation master plan is not launched orderly and transportation planning at bottom level should follow the policy direction from macro level. Public transportation priority development (JAPTRAPIS) should be released after Jabodetabek master plan (SITRAMP). Afterwards, local government in Jakarta Metropolitan Area should consider the SITRAMP and JAPTRAPIS documents to arrange transportation planning in local level. However, what happen in the JMA indicate the different sequence. Macro Transportation Planning (SITRAMP) is at right order but public transportation priority development (JAPTRAPIS) launched after the Jakarta transportation planning and regional planning. This might be the reason why in strategic and action plan of DKI Jakarta are not



match with JAPTRAPIS's proposed plans. As a result, Jakarta Transportation Planning is not accommodating the priority public transport development from JAPTRAPIS.

The JMA has segregated authority and every cities and municipalities under different administration area. Meanwhile, the successfulness of public transport network implementation depends on centralized coordination. The autonomy regulation in Indonesia causes national government has lack of intervention power to the provincial or local government (see Law No. 32/ 2004). Furthermore, the transportation planning master plan (SITRAMP) does not have legal power since it is not legalized by national government. In contrast, the role of central government is crucial to encourage public policy in local level (Jessop, 2002).

## CONCLUSIONS

The explanation and discussion about the implementation integrated transport system indicate that there are a lot of missing links and barriers in each attributes. Ideally, the four attributes should be fully implemented in order to deliver the door-to-door service. Partially implemented integrated transport system would cause the commuter find barriers when traveling from Bekasi to Jakarta and it might be the reason why the market share for public transport in Jakarta Metropolitan Area is decreasing. Moreover, current public transport system is not giving user flexibility to do their daily travel since the choice is limited and every choice of transport modes has their own obstacle and deficiency. Currently, the fragmented public transport system has been affecting inefficient and un-environmental friendly journey.

Transportation planning from national government to local government is not synchronous and it related to sequence of transportation policy which is not developed orderly based on policy level. Moreover, Jakarta Metropolitan Area is not under the integrated authority and each authority does not have clear coordination consensus to develop the urban transportation planning in JMA. Implementation of transportation policy in Jakarta is much more difficult due to multi-level governance.

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